

CORD CIRCUIT SUPERVISORY RELAYS

CURRENT FLOW TESTS

NOS. 14C, 14D, AND 15C "A" SWITCHBOARDS

STEP-BY-STEP SYSTEMS

1. GENERAL

1.01 This section describes a method of making current flow tests of cord circuit supervisory relays in "A" switchboards of step-by-step offices. The tests described are made at the front of the switchboard.

1.02 This section is reissued to include the use of a filter connected across the relay circuit of 206-type polarized relays in Tests (C) and (F) and to bring the section generally up to date. This issue covers a general revision and, therefore, arrows ordinarily used to indicate changes have been omitted.

1.03 The tests covered are:

Methods Using Cord Testing Circuit - SD-31025-01 or SD-90501-01

(A) Answering and Calling Cord Supervisory Relays - Low-Resistance Sleeve: This test checks the operation of the answering and calling cord supervisory relays with low-resistance sleeve.

(B) Answering Cord Supervisory Relays - High-Resistance Sleeve: This test checks the operation of the answering cord supervisory relays with high-resistance sleeve.

(C) Calling Cord Supervisory Relays - High-Resistance Sleeve: This test checks the operation of the calling cord supervisory relay with high-resistance sleeve.

Methods Without the Use of Cord Testing Circuit

(D) Answering and Calling Cord Supervisory Relays - Low-Resistance Sleeve: This test checks the operation of the answering and calling cord supervisory relays with low-resistance sleeve.

(E) Answering Cord Supervisory Relays - High-Resistance Sleeve: This test checks the operation of the answering cord supervisory relays with high-resistance sleeve.

(F) Calling Cord Supervisory Relays - High-Resistance Sleeve: This test checks the operation of the calling cord supervisory relays with high-resistance sleeve.

1.04 The tests should be used as follows:

Type of Cord Circuit	Low-Resistance Sleeve	High-Resistance Sleeve
Combined intercepting and special service cord		
Answering cord	(A) or (D)	(B) or (E)
Calling cord	(A) or (D)	(C) or (F)
Intercepting completing cord		
Answering cord	-	(B) or (E)
Calling Cord	(A) or (D)	(C) or (F)
Special service cord		
Answering cord	(A) or (D)	-
Calling cord	(A) or (D)	(C) or (F)
Recording completing cord		
Answering cord	(A) or (D)	-
Calling cord	-	-
Universal cord		
Answering cord	(A) or (D)	-
Calling cord	(A) or (D)	(C) or (F)
Intercepting cord		
Answering cord	Note	-
Calling cord	(A) or (D)	-

Note: The intercepting answering cord supervisory relay can be tested only at the relay rack using the test set connections and test values given in the circuit requirements tables.

1.05 Tests (A), (B), and (C) are based on the use of cord testing circuit SD-31025-01 or SD-90501-01, or the equivalent. In offices

where a testing circuit has not been provided, Tests (D), (E), and (F) should be used instead of Tests (A), (B), and (C).

1.06 While testing cord circuit relays, the various current values should be checked often enough to make sure that they have not changed due to voltage variations.

1.07 If any of the specified "soak" values can not be obtained, the maximum current that can be obtained will be satisfactory.

1.08 Cord circuits on which trouble is encountered should be removed from service until the trouble has been cleared.

1.09 On some issues of special cord circuit drawings, the current values shown in the circuit requirements tables have not been revised to agree with a change in the method of adjusting 206-type polarized relays which do not have a noninductive resistance bridged across the supervisory relay. In order to care for those cases where the circuit requirements tables have not been corrected, the revised current values for testing these relays from the front of the switchboard are given below and should be used in lieu of any previous values when performing Tests (C) and (F).

	After Soak MA	Test MA
Operate	-75	4.5
Release	75	Open circuit

Current values to be used for testing 206-type polarized relays in DSA switchboard cord circuits at the apparatus are also given below.

	After Soak MA	Test MA	Readjust MA
Operate	-75	3.8	3.6
Release	75	0.3	0.4

1.10 Current values as shown in circuit requirements tables should be used when testing polarized supervisory relays with a bridged resistance across the supervisory relay in special service cords.

1.11 Lettered Steps: The letters a, b, c, etc., are added to a step number to indicate that the steps cover an action which may or may not be required, depending on local conditions. The conditions under which a lettered step or series of steps should be made are given in the ACTION column, and all steps governed by the same condition are designated

by the same letter. Where a condition does not apply, the associated steps should be omitted.

2. APPARATUS

2.01 The apparatus required for each test is shown below. The details for each item are covered in the indicated paragraphs.

Apparatus	No. Required for Test					
	(A)	(B)	(C)	(D)	(E)	(F)
Cord Testing Circuit (2.02)	1	1	1	-	-	-
Test Set (2.03)	1	1	1	1	1	1
Filter (2.04)	-	-	1	-	-	1
Patching Cord (2.05) or (2.06)	1	1	1	1	1	1
Patching Cord (2.07)	1	-	1	-	-	-
Testing Cord (2.08)	-	-	-	-	2	-
2.02 "A" Switchboard Cord Testing Circuit - SD-31025-01 or SD-90501-01.						
2.03 35-Type Test Set.						
2.04 R-2717 Filter. (Fig. 1)						

Note: A filter can be made up locally, if necessary, by connecting one No. 18 AS Resistor (350 ohms \pm 1 per cent), one No. 18 FS Resistor (4250 ohms \pm 1 per cent), and one No. 137 QA Capacitor (4.28 to 4.36 MF) in series.

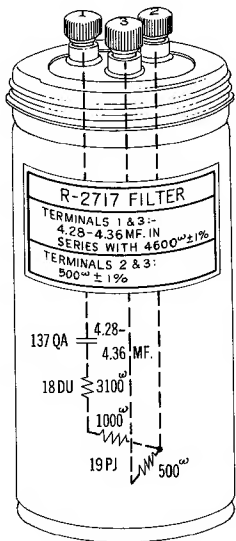


Fig. 1 - R-2717 Filter

2.05 P2G Cord, 10 feet long, equipped with one No. 309 Plug with red shell and one No. 309 Plug with black shell (2P7A Cord) (for use in connecting battery and ground to test set when switchboard jacks require No. 309 Plugs).

2.06 P2H Cord, 10 feet long, equipped with one No. 310 Plug with red shell and one No. 310 Plug with black shell (2P8A Cord) (for

use in connecting battery and ground to test set when switchboard jacks require No. 310 Plugs).

2.07 P3F Cord, 4 feet long, equipped with one No. 309 Plug and one No. 310 Plug (3P12A Cord).

2.08 Two No. 893 Cords, 3 feet long, equipped with two No. 360A Tools (1W13A Cord), and two No. 365 Tools (connecting clip).

3. PREPARATION

ALL TESTS

<u>STEP</u>	<u>ACTION</u>	<u>VERIFICATION</u>
1	Restore all test set keys to normal.	
2	Move all test set resistance slides to extreme right position.	
3	Connect TEST-BATT and GRD jack of test set to battery and ground supply jack in switchboard, using P2G (or P2H) cord, as required.	
	<u>Note:</u> The black-shelled plug should be connected to test set.	
4	Strap binding post GRD, L1, and S of test set with piece of insulated wire.	

TESTS (C) AND (F)

- 5 Using insulated wire connect T and R binding posts of 35-type test set to terminals 1 and 3 of R-2717 filter, or to locally prepared filter.

4. METHODS

<u>STEP</u>	<u>ACTION</u>	<u>VERIFICATION</u>																																
	<u>(A) Answering and Calling Cord Supervisory Relays - Low-Resistance Sleeve</u>																																	
5	Arrange test set keys and switches as follows:																																	
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BATT &																																		
GRD CO	Operated																																	

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<u>STEP</u>	<u>ACTION</u>	<u>VERIFICATION</u>
6a	If testing answering cords where flashing recall arrangement is employed - Operate talking key of cord to be tested.	
7	Insert plug of cord to be tested into T and R jack of test set.	Cord supervisory lamp lights.
8	Close locking lever of key 4.	
9	Adjust No. 4 resistance slides to obtain specified test "release" value for supervisory relay.	Test set meter indicates specified "release" value.
10	Depress key 3 - Adjust No. 3 resistance slides to obtain specified test "operate" value for supervisory relay.	Test set meter indicates specified "operate" value.
11	With key 3 depressed - Depress key 2 - Adjust No. 2 resistance slides for specified test "soak" value.	Test set meter indicates specified "soak" value.
12	Release keys 2 and 3.	Test set meter still indicates specified "release" value.
13	Connect 3R jack of test set to INT jack of cord testing circuit, using P3F cord.	
14	Depress keys 2 and 3 for approximately one second - Release key 2.	Supervisory lamp flashes.
15	After three flashes of supervisory lamp in Step 14 - Release key 3.	Supervisory lamp lights steadily.
	<p><u>Note:</u> The supervisory relay may be considered in satisfactory adjustment if the cord supervisory lamp flashes at uniform intervals when key 2 is released in Step 14 and lights steadily when key 3 is released in Step 15. When it is desired to obtain more flashes, the "soak" current should be applied by depressing keys 2 and 3 in Step 14 for a period of one second for each three flashes.</p>	
16a	If testing answering cord where flashing recall arrangement is employed - Restore talking key of cord under test.	
17	Remove cord under test from T&R jack of test set.	
18b	If other calling or answering cord supervisory relays are to be tested - Repeat Step 6a, if necessary, then Steps 7 and 14 through 17 for each cord.	

<u>STEP</u>	<u>ACTION</u>	<u>VERIFICATION</u>
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Note: To obtain maximum results during testing, the current values should be re-checked frequently by removing cord from INT jack of cord testing circuit and proceeding as in Step 6A, if necessary, then Steps 7 and 9 through 17.

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| 19 | Remove all connections established. | |
| 20 | Remove strap from binding posts GRD, Ll, and S of test set. | |

(B) Answering Cord Supervisory Relays - High-Resistance Sleeve

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|---|--|--|
| 5 | Arrange test set keys and switches as follows: | |
|---|--|--|

<u>Keys</u>	<u>Position</u>	<u>Switches</u>	<u>Position</u>
1	Open	G	Open
2	Open	L	Open
3	Open	RES	0
4	Open		
REV	Normal		
BATT & GRD CO	Normal		

- | | | |
|----|---|---|
| 6a | If intercept completing cord is being tested -
Operate talk key. | |
| 7 | Insert plug of answering cord to be tested into T and R jack of test set. | Back supervisory lamp lights. |
| 8 | Insert plug of associated calling cord into CON jack of cord testing circuit. | |
| 9 | After an interval of 5 to 10 seconds -
Depress key 2 -
Adjust No. 2 resistance slides to obtain specified test "operate" value for primary winding of supervisory relay. | Test set meter indicates specified "operate" value. |
| 10 | Release key 2. | |
| 11 | Remove plug of calling cord from CON jack. | |
| 12 | Depress key 4 -
Adjust No. 4 resistance switches and slides to obtain specified test "release" value for primary and secondary windings of supervisory relay in series. | Test set meter indicates specified "release" value. |
| 13 | With key 4 depressed -
Depress key 3 -
Adjust No. 3 resistance switches and slides to obtain specified "operate" value for primary and secondary windings of supervisory relay in series. | Test set meter indicates specified "operate" value. |

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<u>STEP</u>	<u>ACTION</u>	<u>VERIFICATION</u>
14	Release keys 3 and 4.	
15	Insert plug of associated calling cord into CON jack of cord testing circuit.	
16	After interval of 5 seconds - Depress key 2 momentarily.	Back supervisory lamp extinguished while key 2 is depressed.
17	Remove plug from CON jack.	
18	Depress keys 3 and 4.	Back supervisory lamp extinguished.
19	Release key 3.	Back supervisory lamp lights.
20	Release key 4.	
21a	If intercept completing cord is being tested - Restore talk key.	
22	Remove plug of answering cord under test from T and R jack of test set.	
23b	If other answering cords are to be tested - Repeat Step 6a, if necessary, Steps 7 and 15 through 22 for each answering cord.	
	<u>Note:</u> To obtain maximum results during testing, the current flow values should be rechecked frequently by removing cord from INT jack of cord testing circuit and proceeding as in Step 6a, if necessary, and Steps 7 through 22.	
24	Remove all connections established.	
25	Remove strap from binding posts GRD, L1, and S of test set.	

(C) Calling Cord Supervisory Relays - High-Resistance Sleeve

6 Arrange test set keys and switches as follows:

<u>Keys</u>	<u>Position</u>	<u>Switches</u>	<u>Position</u>
1	Open	G	Open
2	Open	L	Open
3	Open	RES	0
4	Open		
REV	Normal		
BATT & GRD CO	Normal		

7	Insert plug of calling cord to be tested into T&R jack of test set.	Front supervisory lamp lights.
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<u>STEP</u>	<u>ACTION</u>	<u>VERIFICATION</u>
8	Depress key 1 - Adjust No. 1 resistance slides to obtain specified test "operate soak" value for the polarized relay.	Test set meter indicates specified "operate soak" current value.
9	Release key 1.	
10	Depress key 2 - Adjust No. 2 resistance slides to obtain specified test "operate" value for the polarized relay.	Test set meter indicates specified "operate" current value.
11	Release key 2.	
12	Depress key 3 - Adjust No. 3 resistance slides to obtain specified test "release soak" value for polarized relay.	Test set meter indicates specified "release soak" current value.
13	Release key 3.	
14	Connect 3R jack of test set to INT jack of cord testing circuit, using P3F cord.	
15	Depress key 1 for approximately one second.	
16	Operate REV key.	
17	Immediately depress key 2.	Supervisory lamp extinguished.
18	Release key 2.	Supervisory lamp lights.
19	Depress key 3.	Supervisory lamp flashes at uniform intervals.
20	After three flashes - Release key 3.	Supervisory lamp burns steadily.
21	Restore REV key.	
22	Remove plug of calling cord under test from T&R jack of test set.	
23a	If other calling cords are to be tested - Repeat Step 7 and Steps 15 through 22 for each calling cord.	
	<u>Note:</u> To obtain maximum results during testing, the current flow values should be rechecked frequently by removing cord from INT jack of cord testing circuit and proceeding as in Steps 7 through 22.	
24	Remove all connections established.	
25	Remove strap from binding posts GRD, L1, and S of test set.	

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<u>STEP</u>	<u>ACTION</u>	<u>VERIFICATION</u>
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(D) Answering and Calling Cord Supervisory Relays - Low-Resistance Sleeve

- 5 Arrange test set keys and switches as follows:

<u>Keys</u>	<u>Position</u>	<u>Switches</u>	<u>Position</u>
1	Open	G	Open
2	Open	L	Closed to 10
3	Open	RES	0
4	Open		
REV	Normal		
BATT & GRD CO	Operated		

- 6a If testing answering cords where flashing recall arrangement is employed - Operate talking key of cord to be tested.

- 7 Insert plug of cord to be tested into T&R jack of test set.

Cord supervisory lamp lights.

- 8 Close locking lever of key 4.

- 9 Adjust No. 4 resistance slides to obtain specified test "release" current value for supervisory relay.

Test set meter indicates specified "release" value.

- 10 Depress key 3 -
Adjust No. 3 resistance slides to obtain specified test "operate" current value for supervisory relay.

Test set meter indicates specified "operate" value.

- 11 With key 3 depressed -
Depress key 2.
Adjust No. 2 resistance slides for specified test "soak" current value.

Test set meter indicates specified "soak" value.

- 12 Release keys 2 and 3.

Test set meter still indicates "release" value.

- 13 Depress keys 2 and 3 for approximately one second -
Release key 2.

Supervisory lamp extinguished.

- 14 Immediately release and depress key 3 three times.

Supervisory lamp flashes as key 3 is depressed and released.

Note: If additional flashes are required, repeat Steps 13 and 14.

- 15 Release key 3.

Supervisory lamp lights steadily.

- 16a If testing answering cord where flashing recall arrangement is employed -
Restore talking key of cord under test.

<u>STEP</u>	<u>ACTION</u>	<u>VERIFICATION</u>
17	Remove cord under test from T and R jack of test set.	
18b	If other answering or calling cords are to be tested - Repeat Step 6a, if necessary, then Steps 7 and 13 through 17 for each cord.	
	<u>Note:</u> To obtain maximum results during testing, the current flow value should be rechecked frequently by proceeding as in Step 6a, if necessary, and Steps 7 through 17.	
19	Remove all connections established.	
20	Release key 4.	
21	Remove strap from binding posts GRD, Ll, and S of test set.	

(E) Answering Cord Supervisory Relays - High-Resistance Sleeve

5 Arrange test set keys and switches as follows:

<u>Keys</u>	<u>Position</u>	<u>Switches</u>	<u>Position</u>
1	Open	G	Open
2	Open	L	Open
3	Open	RES	O
4	Open		
REV	Normal		
BATT & GRD CO	Normal		

6a If intercept completing cord is being tested -
Operate talk key of cord to be tested.

7 Insert plug of answering cord to be tested into T and R jack of test set.

Back supervisory lamp lights.

8 Connect ground to sleeve and ring of associated calling cord, using two No. 893 cords.

Note: The ground on the ring operates the calling supervisory relay and establishes the charge condition on the cord circuit.

9 After an interval of 5 to 10 seconds -
Depress key 2 -
Adjust No. 2 resistance slides to obtain test "operate" current value for the primary winding of the supervisory relay.

Test set meter indicates test "operate" value.

10 Release key 2.

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<u>STEP</u>	<u>ACTION</u>	<u>VERIFICATION</u>
11	Remove ground from ring of calling cord.	Front supervisory lamp lights.
12	Depress key 4 - Adjust No. 4 resistance switches and slides to obtain specified test "release" value of primary and secondary windings in series.	Test set meter indicates specified "release" value.
13	With key 4 depressed - Depress key 3 - Adjust No. 3 resistance switches and slides for the specified test "operate" value of primary and secondary windings in series.	Test set meter indicates specified "operate" value.
14.	Release keys 3 and 4.	
15	Replace ground on ring of calling cord.	Front supervisory lamp extinguished.
16	After an interval of 5 seconds - Depress key 2 momentarily.	Back supervisory lamp is extinguished while key 2 is depressed.
17	Remove ground from ring and sleeve of calling cord.	Front supervisory lamp lights.
18	Depress keys 3 and 4.	Back supervisory lamp extinguished.
19	Release key 3.	Back supervisory lamp lights.
20	Release key 4.	
21a	If intercept completing cord is being tested - Restore talk key.	
22	Remove plug of answering cord under test from T&R jack of test set.	
23b	If other answering cords are to be tested - Repeat Step 6a, if necessary, Steps 7, 8, and Steps 16 through 22 for each cord. Note: To obtain maximum results during testing, the current flow values should be rechecked frequently by proceeding as in Step 6a, if necessary, and Steps 7 through 22.	
24	Remove all connections established.	
25	Remove strap from binding posts GRD, LL, and S of test set.	

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<u>STEP</u>	<u>ACTION</u>	<u>VERIFICATION</u>
	<u>Note:</u> To obtain maximum results during testing, the current flow values should be rechecked frequently by proceeding as in Steps 7 through 22.	
24	Remove all connections established.	
25	Remove strap from binding posts GRD, Ll, and S of test set.	